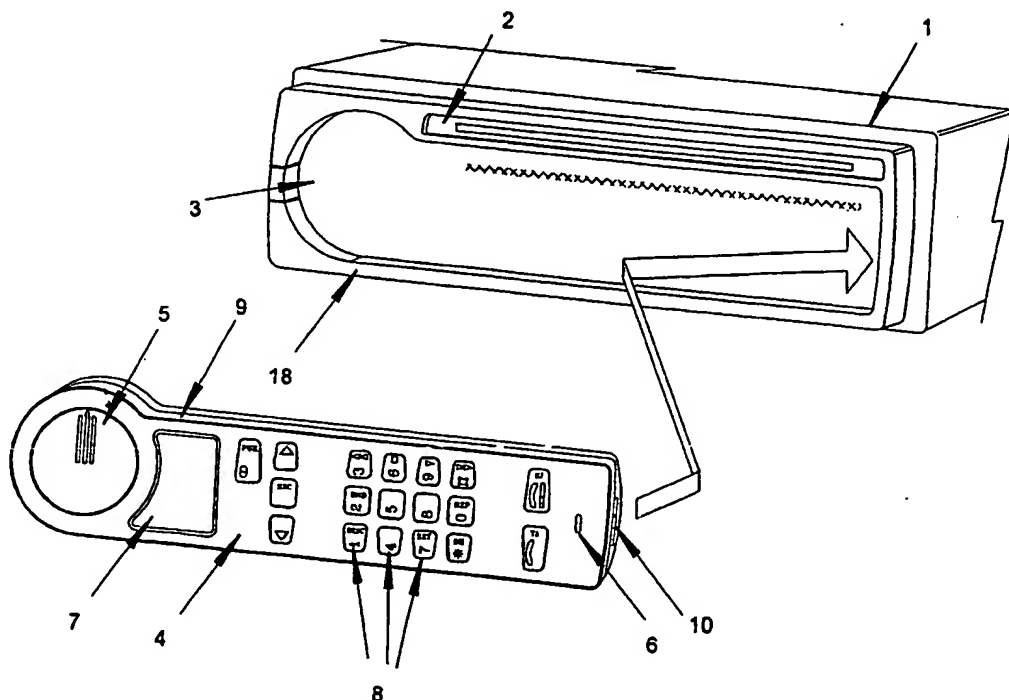


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(21) International Application Number: PCT/GB97/02897 (22) International Filing Date: 21 October 1997 (21.10.97) (30) Priority Data: 9621887.0 21 October 1996 (21.10.96) GB (71) Applicant (for all designated States except US): THE TECHNOLOGY PARTNERSHIP PLC [GB/GB]; Melbourne Science Park, Cambridge Road, Melbourn, Royston, Hertfordshire SG8 6EE (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): MILBOURN, Anthony, John [GB/GB]; 65 High Street, Hail Weston, St. Neots, Cambridgeshire PE19 4JW (GB). (74) Agent: GILL JENNINGS & EVERY; Broadgate House, 7 Eldon Street, London EC2M 7LH (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>	

(54) Title: MOBILE TELEPHONE



(57) Abstract

A hand-held mobile telephone unit (4) is disclosed which can be mounted as the front panel of an in-vehicle audio device (1) to provide operating controls (8) for the audio device when mounted to it, additionally to telephone operation. The unit may be automatically connected to the audio device speaker system (14) and to a separate microphone (17), as well as to a telephone network antenna (13), and its rechargeable battery (12) may be recharged automatically from the vehicle power supply (16).

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MOBILE TELEPHONE

The present invention relates to mobile telephones and, more particularly, mobile telephones having enhanced
5 functionality.

Hand-held mobile telephones are in widespread use and are often used by vehicle owners, but a number of issues arise in connection with the use of mobile telephones in a vehicle. Firstly, there exists the requirement for so-called "hands-free" operation which may be a requirement to
10 allow legal operation of a hand-held mobile telephone within a vehicle in some jurisdictions. Secondly, there is the simple problem of location and positioning of a hand-held mobile telephone within a vehicle, this problem
15 normally being overcome by means of a separate holder of some description supplied as an accessory and requiring to be fitted in the vehicle at a convenient location. Thirdly, there is the problem of the need, frequently, to connect a hand-held mobile telephone to a separate aerial
20 in order to allow it to operate within the confines of the vehicle.

The problem of audio equipment theft from vehicles has become a major factor in the design of audio equipment for vehicles over the past few years and one particularly
25 effective way of overcoming the problem, by way of deterrent, has been to provide a demountable front panel for audio equipment so that the vehicle user can remove an essential operating part of the audio equipment when leaving the vehicle unattended. However, even though such
30 demountable panels are relatively small in size, it is sometimes felt by vehicle users to be a nuisance even to have to take the relatively simple precaution of de-mounting the front panel before leaving the vehicle, simply because the de-mounted front panel then has to be
35 taken away from the vehicle by the user.

The present invention is aimed at overcoming the problems of using mobile telephones and also the problems of audio equipment theft in motor vehicles.

According to the present invention therefore there is
5 provided a hand-held mobile telephone which can be mounted as the front panel of an in-vehicle audio device to provide operating controls for the audio device when mounted to it additionally to telephone operation.

Combining, in a single item, the functions of a mobile
10 telephone and an audio equipment demountable front panel overcomes a number of the perceived problems of carrying a hand-held mobile telephone in a vehicle and security problems associated with audio equipment in a vehicle. Particularly, as the user will normally want to remove the
15 hand-held mobile telephone to take it with him or her when leaving the vehicle, combining the mobile telephone with the audio equipment demountable front panel, increases the security of the audio equipment by making it much more likely that the front panel will be removed when the
20 vehicle is unattended. At the same time, having a simple and convenient location for the mobile telephone within the vehicle can simplify its operation within the vehicle.

Since conventional audio equipment demountable front panels are generally elongate horizontally whereas mobile
25 telephones are generally elongate vertically, if the mobile telephone is to function in an existing audio system front panel, ie one complying with the standard DIN housing dimensions, the operating buttons required by the combined unit need to be adapted to make it easy for the user to use
30 them in both the telephone mode and the audio mode. This may be achieved by providing the key legends angled to the horizontal and vertical axes, so that they can be read when the telephone is connected to the audio equipment and when it is separate. To avoid a proliferation of extra keys,
35 the keys preferably have multiple functions and are switchable between functions. In such cases, the arrangement can be such that when the telephone is removed

from the audio equipment it is automatically switched to the telephone mode with the key functions being correspondingly switched. Preferably, the arrangement is also such that, when the audio device is playing and a call
5 is received on the mobile telephone, the device is automatically switched to the telephone mode. The keys may be marked accordingly with dual legends, one set, for audio operation, being marked with the necessary characters having an upright axis parallel to the axis transverse to
10 the elongate axis of the unit and the other set, the usual characters for phone operation, either being angled as mentioned above, or having an upright axis parallel to the longitudinal axis of the unit. An alternative is to provide the buttons with programmable legends capable of
15 changing axes automatically depending upon the mode of operation.

Additionally, characters to be displayed on a display incorporated in the unit are preferably arranged to be presented on different axes depending on whether or not the
20 unit is mounted to the audio equipment or not. This may be achieved by selective illumination of the different characters or legends or else by the use of pixels displays controlled by suitable software. Switching of the display can be achieved automatically by means of simple contacts
25 provided between the unit and the audio equipment housing and, similarly, the function of the buttons on the unit can be switched between telephone operation and audio equipment operation automatically on installation, while providing a means for switching to telephone mode at the user's desire
30 while the unit is mounted in the audio equipment.

Furthermore, the unit of the invention can also enable automatic hands-free operation, re-charging of the internal battery etc. to allow the telephone to be operated within the vehicle, and use of the audio equipment vehicle
35 speakers. A separate microphone may be provided if required. Connection to an external antenna can also be provided on mounting of the unit within the audio

equipment, with an optional booster amplifier being automatically coupled into the system if present. All the necessary connections may be provided by means of a conventional type of connector on the demountable unit so
5 that out-of-vehicle charging etc. can be provided in conventional fashion. A detection mechanism coupled to the connector may control the automatic switching of the telephone between its two modes of operation.

One design of a combination demountable front panel
10 and mobile telephone system according to the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 illustrates a front view of a vehicle audio device with a demountable panel/mobile telephone handset
15 incorporated therein;

Figure 2 is a perspective view showing the handset removed from the audio device; and

Figure 3 is a block diagram of the system components showing their interrelationships.

20 The example illustrated in the drawings comprises a vehicle audio device 1 which has a conventional dashboard mounted housing 18 which incorporates a CD player with a slot 2 for insertion of a compact disc, and a recess 3 for mounting the handset/panel 4, and which contains the
25 necessary mechanical and electronic components to allow playing of a compact disc and connections to the vehicle audio speaker system 14 and external antenna 13 (see figure 3). The audio device preferably incorporates conventional radio functions and thus includes a suitable antenna 15
30 (see figure 3), and the embodiment shown is merely illustrative of the concept and the invention is not limited thereto. The telephone handset/front panel 4 has the usual mobile telephone circuitry 11 (see figure 3), incorporating a loudspeaker 5 and microphone 6 necessary
35 for conventional use of the handset and a re-chargeable battery 12 (see figure 3), together with an LCD display 7 and plural operating buttons or keys 8 all contained within

an elongate housing 9 which corresponds in shape with that of the recess 3 in the audio device housing 18.

At one end, the handset/panel 4 has a location detect mechanism 21 which includes a multi-terminal connector 10 which, on mounting in the audio device 1 connects with a complementary connector (not shown) in the recess 3. This allows the detect mechanism 21 to detect whether the handset/panel housing 9 is coupled to the audio device 1, and also provides electrical connection between the handset/panel 4 and the audio device 1 in order to provide the required functionality for operating the audio device 1 and at the same time allowing connection to enable hands-free operation of the mobile telephone 4 by connecting the handset to an external telephone antenna 13 and to the speaker system 14 associated with the audio device 1. Automatic switching to the telephone mode (in which the audio output is masked or muted can also be controlled by the detect mechanism 21. Charging of the conventional rechargeable battery 12 contained within the handset/panel 4 can also be provided from the vehicle power supply 16 (see figure 3) which conventionally powers the audio device 1.

The characters 19 to be displayed on the LCD display 7 comprise those normally available for telephone operation and, additionally, those required for audio device operation and their orientation within the display 7 is arranged to change automatically on insertion or removal of the handset/panel 4 into or from the recess 3 in the audio device 1. Similarly, the function of the various operating buttons 8 may be changed automatically, but, additionally, use of the buttons for audio device operation may be overridden (say by an initial operation of the "send" key 20 when it is required to use the telephone 4 within the vehicle. The indicia 19 on the buttons 8 may be arranged as shown so that those indicia required for audio device operation are readable upright when the handset/panel is mounted as shown in Figure 1 and the, usually simpler, indicia required for telephone operation are readable

upright when the handset/panel 4 is removed and is turned so that its longitudinal axis is upright. The handset housing 9 will contain the conventional removable SIM (subscriber identity module) which is not shown, and houses
5 the conventional rechargeable battery 12 so that the handset/front panel 4 is capable of totally independent operation when removed from the vehicle.

If desired, a remote control for the audio device 1, of the type known already, may also be provided with
10 suitably enhanced functionality to allow remote control of the telephone functions when the handset/front panel 4 is mounted in the recess 3, thus allowing the user of the vehicle to operate the audio device 1 as well as the telephone without moving his or hands from the
15 neighbourhood of the steering wheel.

CLAIMS

1. A hand-held mobile telephone (4) adapted to be mountable as the front panel of an in-vehicle audio device (1) to provide operating controls (8) for the audio device when mounted to it, additionally to telephone operation.
2. A hand-held mobile telephone (4) according to claim 1, having a plurality of operating keys (8), at least some of the keys having legends (19) thereon angled to the horizontal and to the vertical axes of the telephone.
3. A hand-held mobile telephone (4) according to claim 1, having a plurality of operating keys (8), at least some of the keys having legends for display thereon in either of two orientations.
4. A hand-held mobile telephone (4) according to any of claims 1 to 3, having a display panel (7) and means for displaying characters or icons thereon in either of two orientations.
5. An in-vehicle audio device (1) having a demountable front panel comprising a hand-held mobile telephone (4) according to any of claims 1 to 4.
6. An in-vehicle audio device (1) according to claim 5, comprising means for automatically switching the hand-held mobile telephone (4) to telephone operation when it is removed from the audio device.
7. An in-vehicle audio device (1) according to claim 5 or claim 6, comprising means for automatically switching the hand-held mobile telephone (4) to audio device operation when it is mounted to the audio device.

8. An in-vehicle audio device (1) according to claims 6 and claim 7, when dependent on claim 3, comprising means for automatically switching the display of the key legends (19) between the two orientations when the mobile telephone (4) is mounted to or removed from the audio device (1).
9. An in-vehicle audio device (1) according to claim 7, comprising means for automatically switching the mobile telephone (4) to telephone operation when a call is received.
10. An in-vehicle audio device (1) according to claims 6 and claim 7, when dependent on claim 4, comprising means for automatically switching the display of characters or icons on the display (7) between the two orientations when the mobile telephone (4) is mounted to or removed from the audio device (1).
11. An in-vehicle audio device (1) according to claims 6 and claim 7, wherein the mobile telephone (4) has plural keys (8) having plural legends (19) adapted to be selectively illuminated dependent upon whether when the mobile telephone (4) is mounted to or removed from the audio device (1).
12. An in-vehicle audio device (1) according to any of claims 5 to 11, further including a microphone (17), and means for connecting the microphone to the mobile telephone (4) when the mobile telephone is mounted to the audio device (1).
13. An in-vehicle audio device (1) according to any of claims 5 to 12, further including a speaker system (14), and means for connecting the speaker system to the mobile telephone (4) when the mobile telephone is mounted to the audio device (1).

14. An in-vehicle audio device (1) according to any of
claims 5 to 13, further including a mobile telephone
network antenna (13), and means for connecting the
mobile telephone network antenna to the mobile
telephone (4) when the mobile telephone is mounted to
the audio device (1).
15. An in-vehicle audio device (1) according to claim 14,
further including a signal amplifying booster
connected to the mobile telephone network antenna (13)
and the mobile telephone (4).
16. An in-vehicle audio device (1) according to any of
claims 5 to 15, wherein the mobile telephone (4)
further includes a rechargeable battery (12), and
means for connecting the rechargeable battery to a
vehicle power supply (16) when the mobile telephone is
mounted to the audio device (1).

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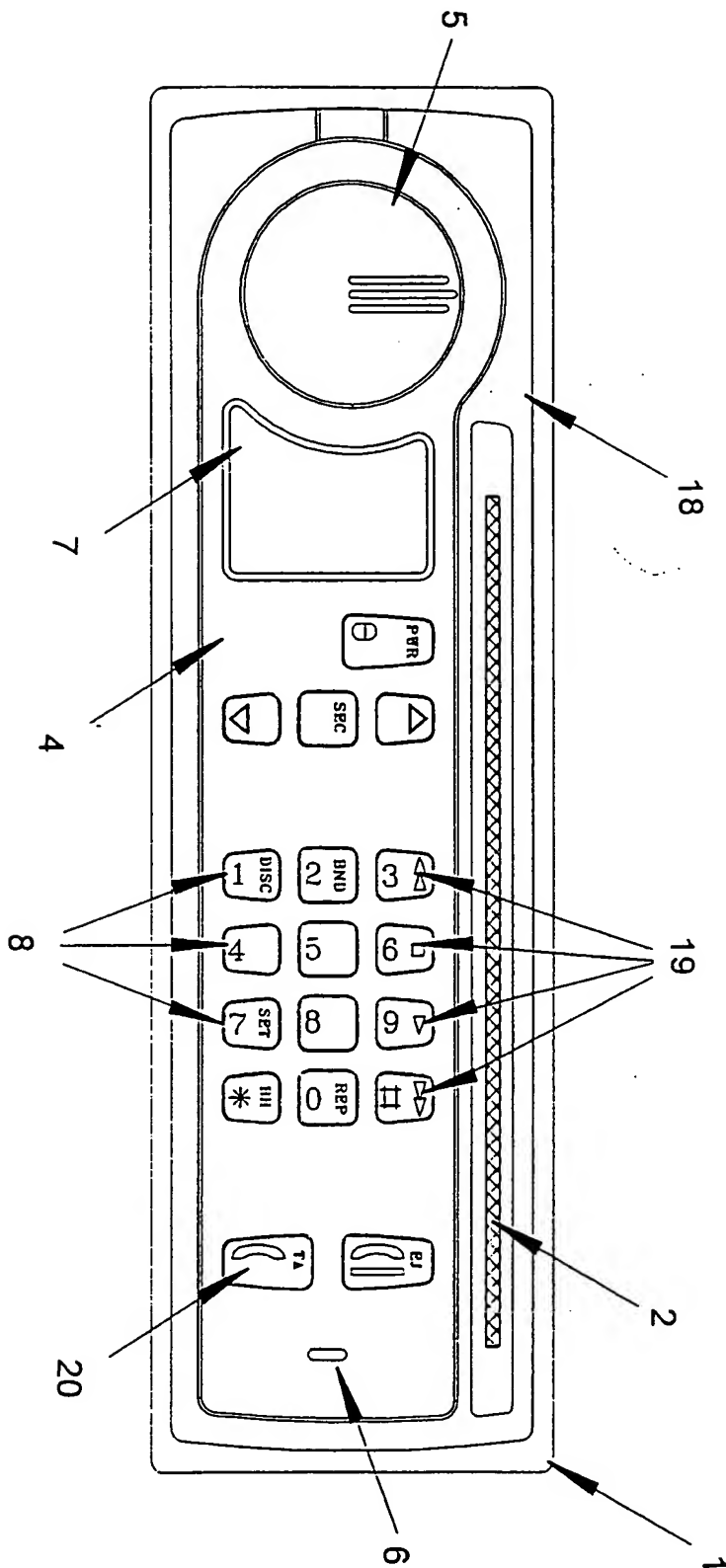


Fig. 1.

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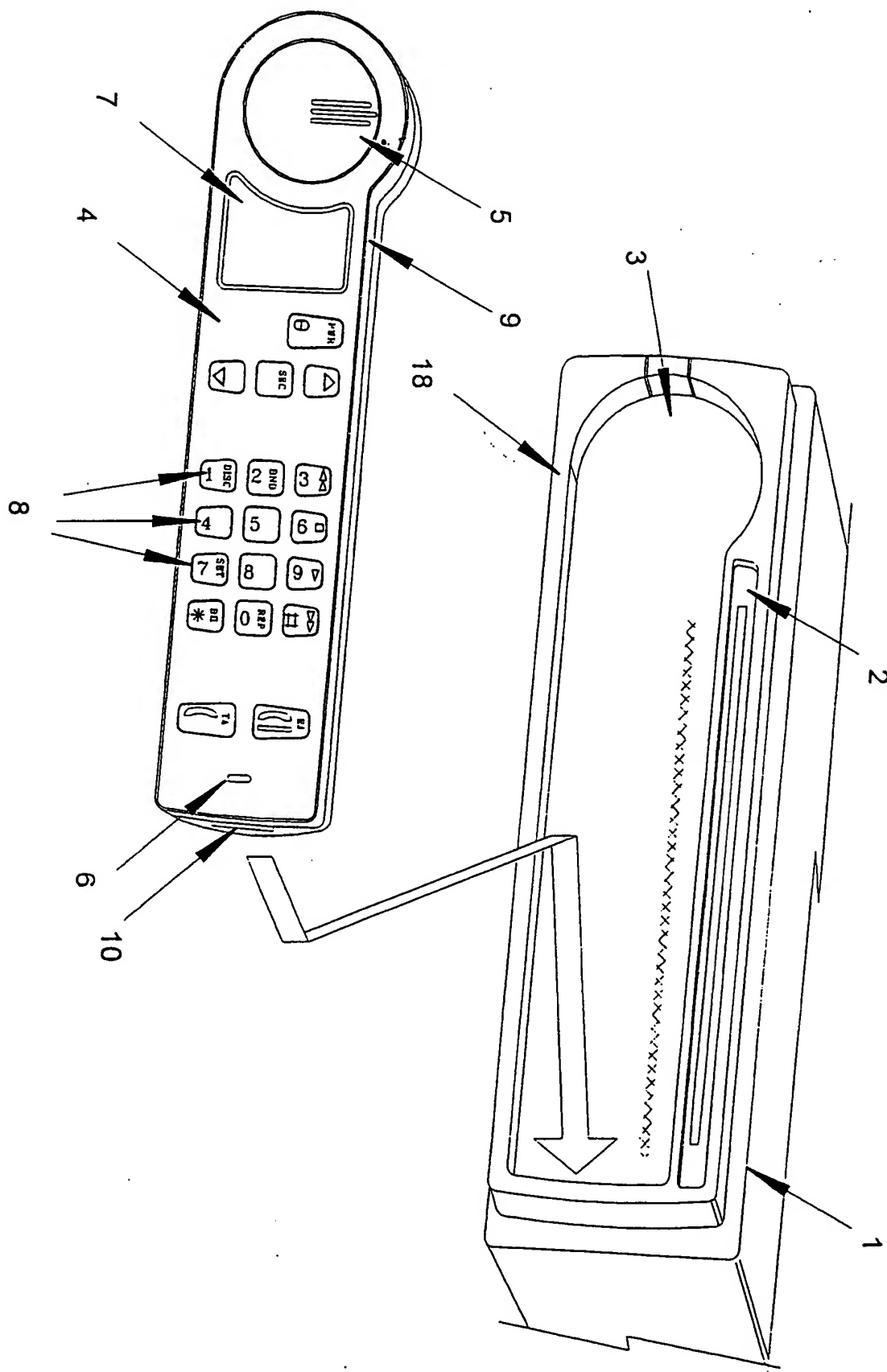


Fig. 2.

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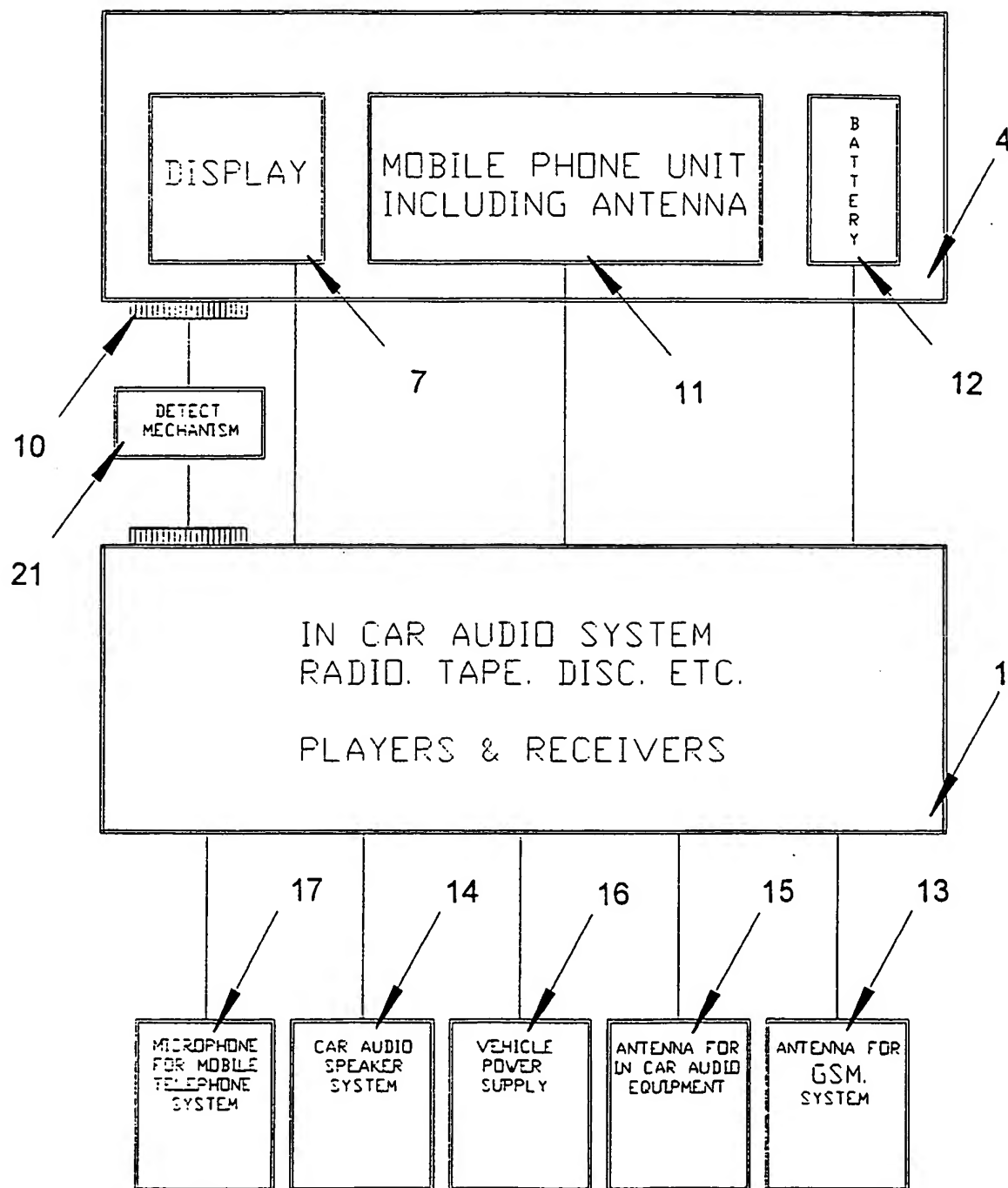


Fig. 3.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/02897

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B60R11/02 H04M1/04

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B60R H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 43 00 848 A (PIONEER ELECTRONIC CORP) 12 August 1993 see figures 1-3 see abstract	1,5-7, 12-15
A	see column 2, line 51 - column 5, line 29	2-4,8,9, 14
X	DE 91 09 141 U (BLAUPUNKT-WERKE GMBH) 28 November 1991 see figures	1,5
A	see page 1, line 1 - page 3, line 27	2-4,6,7, 14
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INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 156 297 A (INT STANDARD ELECTRIC CORP ;STANDARD ELEKTRIK LORENZ AG (DE)) 2 October 1985 see figures see abstract see page 4, line 1 - page 6, line 17 ---	1,5
P,X	WO 97 25222 A (ORIENT POWER AUTO ELECTRONICS ;HOO FUN LIN (GB)) 17 July 1997 see figures see abstract see page 4, line 1 - page 8, line 6 -----	1,5

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. .tional Application No

PCT/GB 97/02897

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4300848 A	12-08-93	JP 5199153 A JP 5199173 A	06-08-93 06-08-93
DE 9109141 U	28-11-91	NONE	
EP 0156297 A	02-10-85	DE 3410477 A BE 901992 A JP 61001122 A US 4646344 A	26-09-85 23-09-85 07-01-86 24-02-87
WO 9725222 A	17-07-97	AU 1199797 A	01-08-97